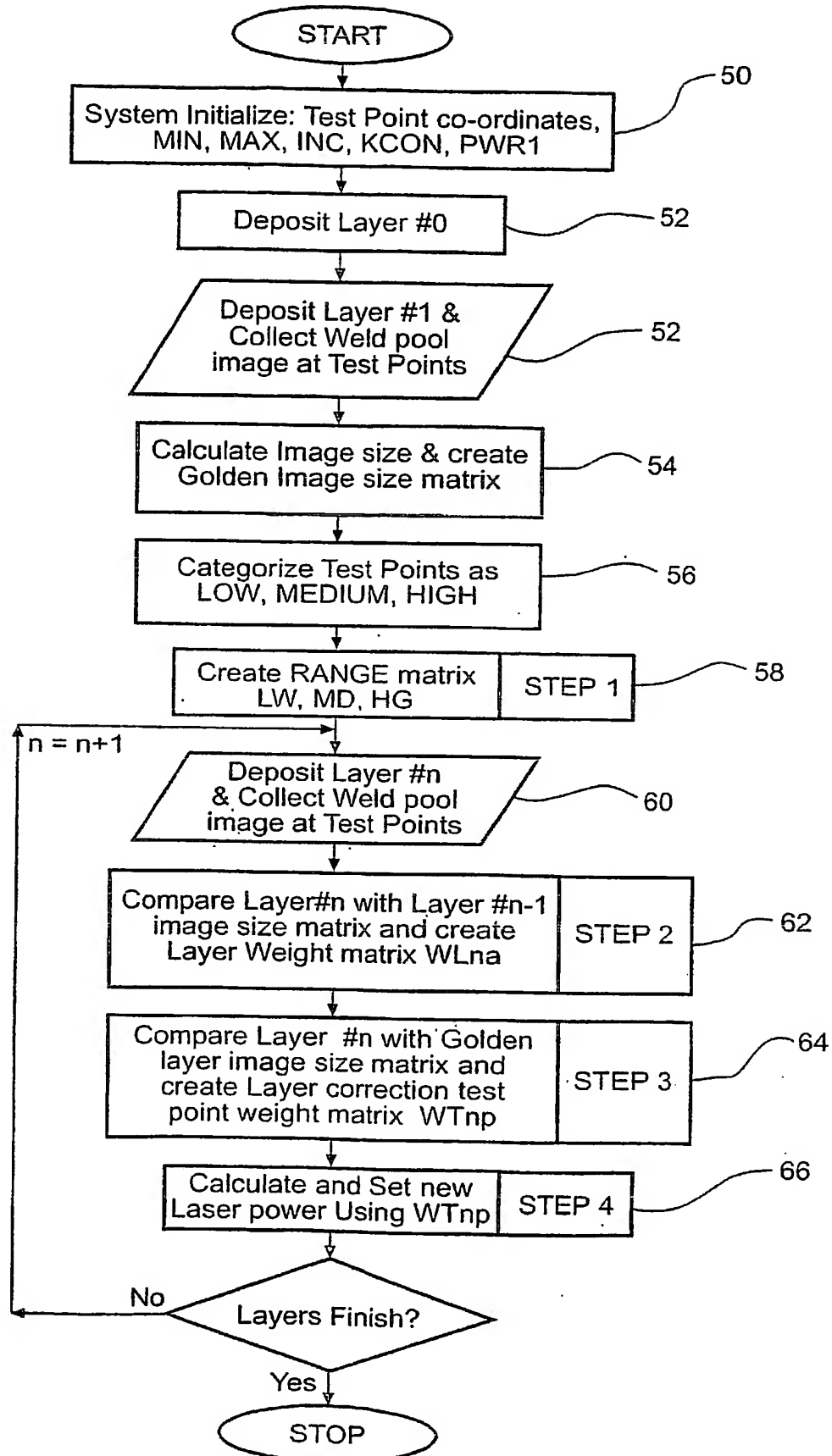


FIG - 2

2/3

FIG - 3



$LY_n$  LY is the deposition LAYER  
 $TP_{np}$  TP is the Test point co-ordinates  
 $IM_{np}$  IM is the Weld pool image size  
 $LW_a$  Low Range matrix  
 $MD_a$  Medium Range matrix  
 $HG_a$  High Range matrix  
 $WL_{na}$  Layer weight matrix  
 $WT_{np}$  Layer correction test point weight matrix  
 $PWR_n$  Laser Power

n: Layer number, where  $n = 2$  to  $m$ ; 'm' is last layer of deposition;  
 p: Test point co-ordinate number, where  $p = 1$  to  $q$ ; 'q' is the last test point co-ordinate  
 a: Element number of the Range and Layer Weight matrix, where  $a = 2$  to  $b$ ; 'b' is the last element  
 H: Biggest Golden layer test point image size  
 L: Smallest Golden layer test point image size  
 $PWR_1$ : Golden Layer Laser Power  
 $LY_1$  = Golden layer,  $LY_0$  = Base metal contact deposition layer  
 $LW_1 = MD_1 = HG_1 = WL_{n1} = 1$   
 MIN, MAX, INC, KCON, LCON, MCON, HCON are Control system constants

STEP1: CREATING RANGE MATRIX (GOLDEN LAYER DATA PROCESSING)

$LW_a = LW_{(a-1)} + (H-L) / LCON$   
 $MD_a = MD_{(a-1)} + (H-L) / MCON$   
 $HG_a = HG_{(a-1)} + (H-L) / HCON$   
 $(H-L) > LCON > MCON > HCON$

STEP2 : CREATING LAYER WEIGHT MATRIX (BY USING PREVIOUS LAYER TEST POINT IMAGE SIZE)

$WL_{na} = WL_{n(a-1)} - INC - ([\sum_{p=1 \text{ to } q} (IM_{np} - IM_{(n-1)p})] / q) \cdot KCON$   
 If  $WL_{na}$  is less than MIN, set  $[WL_{na} = MIN]$

STEP3 : CREATING LAYER CORRECTION  
TEST POINT WEIGHT MATRIX (USING GOLDEN LAYER TEST POINT IMAGE SIZE)

$WT_{np} = WL_{na}$

Selection of index 'a' of  $WL_{na}$  : If the test point coordinate 'p' in  $WT_{np}$  is LOW / MEDIUM / HIGH test point, search for the nearest equivalent of  $(IM_{np} - IM_{1p})$  value in LW / MD / HG. Take the corresponding 'a' index number from LW / MD / HG. In cases where the  $(IM_{np} - IM_{1p})$  value is greater than all entries in LW / MD / HG,  $[WT_{np} = MIN]$  and if  $(IM_{np} - IM_{1p})$  value is less than all entries in LW / MD / HG,  $[WT_{np} = MAX]$ .

STEP4 : CALCULATING NEW LASER POWER FOR THE NEXT LAYER

$PWR_{n+1} = PWR_1 \cdot ([\sum_{p=1 \text{ to } q} (WT_{np})] / q)$

FIG - 4